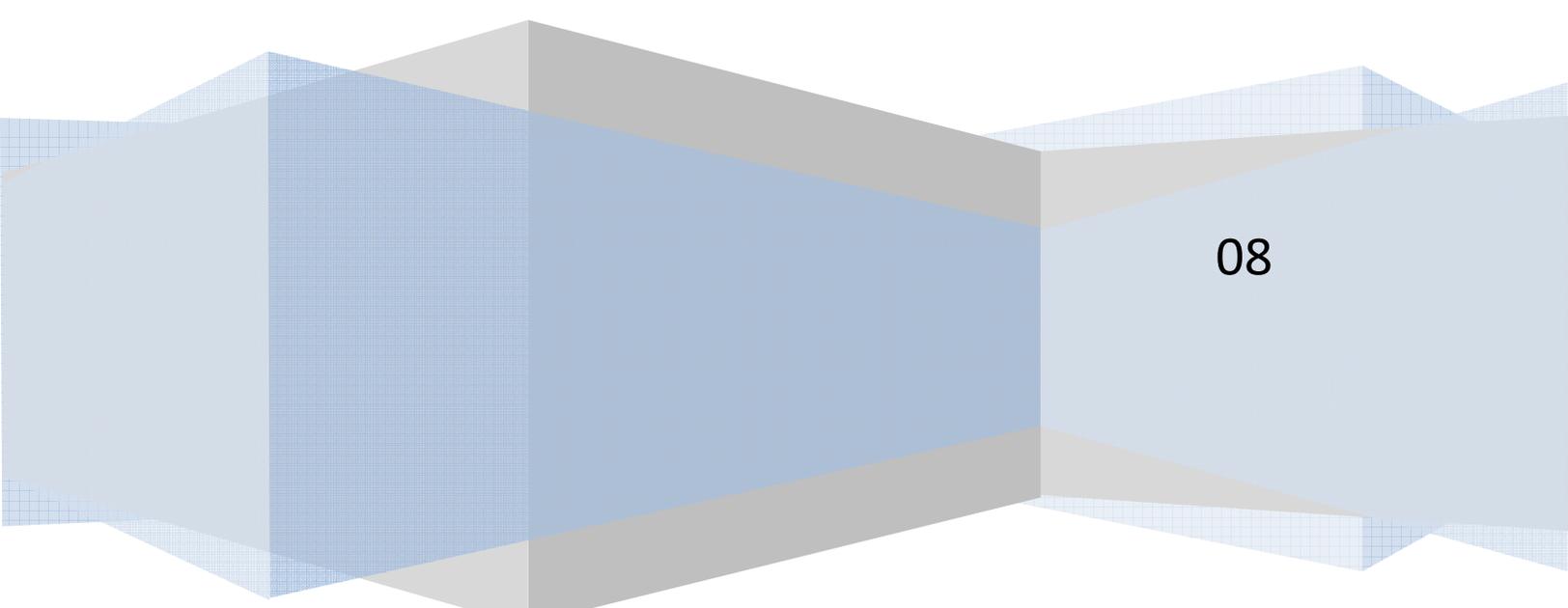


American Youth Policy Forum

Supporting High Quality Career and Technical Education through Federal and State Policy

Betsy Brand



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In 2007-2008, the James Irvine Foundation funded the American Youth Policy forum to hold a series of forums on Career and Technical Education (CTE) to help national policymakers learn about CTE reforms. The American Youth Policy Forum expresses its gratitude to the James Irvine Foundation for their support of this project.

The ideas in this paper were drawn from four policy presentations on Career and Technical Education and a meeting of experts held in Washington, DC and funded with the generous support of the James Irvine Foundation. A list of forum presenters and participants in the meeting of experts appears at the end of this paper. This paper reflects the views of the American Youth Policy Forum and does not necessarily represent the views of the Irvine Foundation, presenters, or experts.

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Introduction

The ostensible purpose of education is to ensure that we have a skilled workforce and engaged citizenry to keep our nation, economy, communities, and families healthy and productive. This broader mission is often lost in the debates on education and school reform that focus too myopically on getting students to pass a certain test or gain entrance into Ivy League colleges. While the benefits of college in terms of lifetime earnings, health, and civic participation are known, success in our economy and society isn't limited to the attainment of a four-year college degree, and many well-paying careers do not require a bachelor's degree. This raises the question of whether the "college for all" approach has constrained our vision for high school reform.

To be successful in our complex world and workplaces, students must develop appropriate reading, writing, and mathematical knowledge and skills. But students need other skills, too. They need to be fluent in the use of information technologies, know how to apply knowledge to solve problems, and possess what are commonly referred to as 21st Century Skills.¹ High schools, for the most part, however, are not currently structured to help students learn these types of skills.

School reform efforts are also rightly looking at why so many students leave high school without a diploma. While many students drop out of high school because of lack of academic press and preparation, we also know that many, maybe most, high school youth are bored and disengaged in their learning, and they don't see how their academic classes are related to careers or to later life. Consequently, many check out mentally and physically.

As education policymakers wrestle with the complexities of school reform and ensuring a well-educated and skilled workforce, career and technical education (CTE) continues to surface as a tested strategy to engage students in their learning and prepare them for postsecondary education and the complex world of the 21st Century.

Over the years, CTE has been an important learning option for many high school students. Historically, career and technical education (or vocational education as it has been known) has prepared thousands of students for livable-wage occupations after high school. Recently, CTE programs have revamped their curriculum to include more academic content and demonstrate more clearly how academic concepts are applied to technical or occupational settings. CTE supplements, enhances, and reinforces the teaching of academic content, especially science and mathematics, provides the context for learning academic skills, and demonstrates how theoretical and conceptual knowledge can be applied in real-world settings. It prepares students to pursue academic and technical studies at the postsecondary level and beyond, helping students see the

¹ 21st Century skills are commonly referred to as critical thinking, problem-solving, information technology, communication, self-direction, teamwork, and collaboration skills. The Conference Board, Partnership for 21st Century Skills, Corporate Voices for Working Families, and Society for Human Resource Management. (2006). *Are they really ready to work?* Tucson, AZ: Partnership for 21st Century Skills.

connection between their studies and the careers they want. CTE programs also provide opportunities for students to work with adults in meaningful activities, allowing for mentoring to occur naturally, and developing employability skills.

Despite the widespread presence of CTE in most high schools, many policymakers have limited knowledge about CTE and the changes it has undergone or are unsure how CTE can play a role in redesigned high schools and expanded learning options for youth. This paper will provide ideas on how federal and state policies can support a greater role for CTE in high school reform by providing meaningful, relevant, and rigorous learning opportunities for all youth.

ISSUES AND RECOMMENDATIONS

The federal government can provide significant leadership in high school reform by articulating a vision and approach for how federal resources can support a systemic approach to knowledge and skill development for all youth, both in- and out-of-school. The No Child Left Behind Act (NCLB), Carl D. Perkins Career and Technical Education Act (Perkins), and Workforce Investment Act (WIA) which support the development of knowledge and skills for young people, should be aligned and coordinated to support a system of multiple learning options for young people. The federal government should require states to conduct a scan across agencies to identify policies and programs related to skill development for young people and develop a statewide framework with clear roles and expectations for each. In addition, providing increased flexibility in program design and service delivery can assist states and localities in developing effective and innovative educational offerings designed to meet the unique needs of various youth populations and that draw on multiple resources from a range of providers and funding sources. Federal and state policymakers should acknowledge the key role CTE programs and pedagogies play in meeting the needs of young people.

More specifically, this paper addresses the following issues and includes recommendations for each:

- Perception of Career and Technical Education
- Narrow Definitions of Student Success
- Limited Involvement of Career and Technical Educators in the Development of Secondary School Policies
- Multiple Pathways to Postsecondary Education and Careers
- Integrated, Applied Curriculum and Instruction
- Multiple Assessments
- Connections to Postsecondary Education
- Guidance and Advisement
- Training and Professional Development
- Teacher Certification and Credentialing
- Quality of Career and Technical Education Programs
- Evaluation of Student Participation in Career and Technical Education

Perception of Career and Technical Education: The public and many policymakers tend to have a negative and/or outdated image of CTE believing that CTE lacks academic rigor, leads to antiquated, undesirable, or low-paying jobs, limits access to college, and serves only low-performing students. But this is not today's reality. Career and technical education is a strategy

that can be effectively used to increase student engagement, improve high school attendance and graduation, supplement and enhance academic learning, develop applied skills, and allow students to earn college credit while in high school, prepare for postsecondary education, and gain necessary skills for careers.

Research shows that certain students who take CTE courses perform as well or better than students not in CTE programs,² have lower dropout rates,³ and earn more money in the labor market.⁴ Other high quality research supported by the U.S. Department of Education has shown that students who take math-enhanced CTE courses perform at higher levels than students who do not.⁵ This growing research base is helping to build the case that CTE can improve student outcomes and serve a wide-range of students. Unfortunately, these studies receive little attention by national policymakers, researchers, educators, and the public at large. And, despite well-publicized efforts like the National Association of Manufacturers' *Dream It. Do It*⁶ campaign to change the public's perception about manufacturing, teachers, parents, and guidance counselors are still slow to encourage students to pursue high-skilled manufacturing and other technical career tracks, despite the availability of high-wage, career ladder jobs.

Recommendation: Research about the value of CTE and how it can improve student outcomes needs to be more widely disseminated to the broader educational enterprise and the public. Policymakers should use this research to inform the development of high school reform policies and programs. More high quality research about the value of CTE should be supported, particularly longitudinal research that examines student outcomes in postsecondary education and careers. Parent-teacher organizations and guidance counselors should be key recipients of this information.

Narrow Definitions of Student Success: The standards-based accountability movement has adopted a narrow definition of student success based on academic proficiency in certain core academic subjects. This focus on academics is crucial, but ignores the development of other important knowledge and skills. The mediocre performance of U.S. students on the PISA (Programme for International Student Assessment)⁷ that compares the ability of students to apply their knowledge in reading, math, and science is an indication that American students are not learning the full range of skills needed to be competitive in a global economy. While it is understandable that state accountability systems have initially focused on measuring basic

² Castellano, M., Stone, J. R., III, Stringfield, S., Farley, E. N., and Wayman, J. C. (2004). *The effect of CTE-enhanced whole-school reform on student coursetaking and performance in English and science*. St. Paul, MN: National Research Center for Career and Technical Education.

³ Plank, S., DeLuca, S., and Estacion, A. (2005). *Dropping out of high school and the place of career and technical education: A survival analysis of surviving high school*. St. Paul, MN: National Research Center for Career and Technical Education.

⁴ Kemple, J. J. and Scott-Clayton, J. (2004). *Career academies: Impacts on labor market outcomes and educational attainment*. New York, NY: MDRC .

⁵ Stone, J. R., III, Alfeld, C., Pearson, D., Lewis, M. V., and Jensen, S. (2006). *Building academic skills in context: Testing the value of enhanced math learning in CTE* (Final study). St. Paul, MN: National Research Center for Career and Technical Education.

⁶ http://www.nam.org/s_nam/sec.asp?CID=201487&DID=229867. Retrieved April 21, 2008.

⁷ PISA – The OECD Programme for International Student Assessment.

<http://www.pisa.oecd.org/dataoecd/51/27/37474503.pdf>

Retrieved April 23, 2008.

academic skills, many argue that they must also measure how students apply and use their knowledge and whether or not students possess skills critical to success in postsecondary education and the workplace, including critical thinking and problem-solving. State academic assessments (e.g. end-of-course exams or high-stakes tests) rarely include measurements of applied knowledge and other critical skills and rarely address the development of technical or occupational skills. This narrow definition of student success has many ramifications: first, it signals that disciplinary content knowledge is the only type of knowledge worth learning and devalues the attainment of other types of knowledge; it severely limits the type of assessments that are developed which can unfairly disadvantage many students who are more successful in demonstrating competency or proficiency as opposed to taking standardized tests; it limits instruction to narrowly defined academics; and it almost never addresses the need to develop skills for civic and social engagement and employment.

Recommendation: Education policymakers along with parents, employers, and the public must engage in a dialogue around the full range of skills that are needed by youth to be successful. Policymakers and stakeholders, especially employers, need to develop greater clarity around the definition of student success. NCLB should acknowledge the importance of developing more than just academic skills, and states should engage in a dialogue to identify the full range of skills they want students to possess and will assess.

Limited Involvement of Career and Technical Educators in the Development of Secondary School Policies. Educational bureaucracies at the federal, state, and local levels are organized around discrete and separate divisions of instruction, pedagogy, and services, such as academic instruction, special education, career and technical education, and student support services. This structure often prevents the development of holistic and integrated policies, because policy has traditionally been developed by individuals who are responsible for academically-oriented education.

Many education policymakers, especially those who are most familiar with traditional academic or college-preparatory instruction, do not value CTE as a pedagogy or assume that instruction is pegged to a low academic level (admittedly, this had been true in the past). As such, they are unfamiliar with how high quality CTE programs can contribute to improved academic outcomes for students⁸ and how CTE can assist students with the development of applied learning skills. The “non-academic” divisions are sometimes viewed as less relevant or essential to academic instructional activity, and the perspective of CTE has often been neglected in policy discussions about high school reform.

Recommendation: Federal and state policy leaders must break down silos between academic, general, CTE, and special education so all perspectives and stakeholders are involved in policy development. When all perspectives are integrated and involved, more comprehensive policies and programs that draw upon all instructional resources, pedagogies, and supports can be developed. Policy leaders need to ensure that CTE is “at the table” when developing and implementing high school reform strategies, especially related to teaching, instruction,

⁸ ConnectEd: The California Center for College and Career. (2007). *A profile of the California Partnership Academies, 2004-2005*. Berkeley, CA: Career Academy Support Network, University of Berkeley and ConnectEd: The California Center for College and Career.

curriculum, and assessments. When states develop or amend state standards, it is critical they involve CTE educators in the process.

Multiple Pathways to Postsecondary Education and Careers: There is growing momentum to create multiple pathways to postsecondary education and careers and to provide students with differentiated education to help make their learning more effective. Creating multiple pathways means making high schools look very different than the comprehensive high school many of us know. It means creating rigorous learning opportunities that are based on themes that appeal to students' interests and that help students see connections between the academic content they are learning and how it is applied, as well as providing smoother connections to postsecondary education and good careers. Pathways can include college preparatory academic curriculum, focused programs of study in a career area or discipline like the arts, and/or programs that articulate postsecondary education credit for students. Many communities are using career and technical themes to design these pathways, as CTE provides a meaningful thematic structure, provides the opportunity for applied learning, and connects to postsecondary programs and employers. Effective career pathways should be multi-year (with a three-to-four year sequence of courses), include an academic as well as a technical core, and offer job shadowing, internships, or work with school-based enterprises. Pathways must also provide any necessary supplemental services in reading, writing, or mathematics to enable students to complete the academic and technical cores. Students and parents must be provided with information and guidance on selecting a pathway. The sixteen career clusters designated by the U.S. Department of Education⁹ can serve as a useful framework for developing multiple pathways to graduation. Career clusters are a strategy to organize academic and occupational curriculum and create a clearer route from secondary to postsecondary education, including options to earn bachelors and masters degrees. Career pathways can also provide a framework for developing programs for students who are disengaged or out of school to reconnect them to education and training.

Recommendation: Federal and state policy leaders should define and describe a high school reform framework for all youth that supports multiple pathways to graduation including a well-defined role for CTE with academically rigorous expectations, and they should provide funding to support the development of these multiple pathways. Federal and state policymakers can fund innovative approaches to developing multiple pathways based on CTE or the career clusters to be used as examples by others. Innovative policies that support flexible school scheduling and organization should be encouraged to draw on resources throughout the community and to address concerns that a CTE program of study pathway would limit students from completing college preparatory or Advanced Placement courses because of time.

Integrated, Applied Curriculum and Instruction: Most instructional programs in high schools are designed to focus on theory and conceptual knowledge within a single disciplinary content area. Most high school curriculum and instruction tend not to show how the knowledge is applied or used. Also, curriculum and instruction are usually focused on a single discipline, and there are limited instances of cross-disciplinary or integrated curriculum, which help learners

⁹ About 15 years ago, the U.S. Dept. of Education divided the world of work into 16 groupings of occupations called Career Clusters. Career Clusters provide a way for schools to organize instruction and student experiences around sixteen broad categories that encompass virtually all occupations from entry through professional levels.

<http://www.okcareertech.org/okcareerclusters/about.htm>

Retrieved February 27, 2008.

make connections. As a result, too many students ask, “Why do I have to learn this?” We do our youth a disservice by not making more explicit connections between academic and applied knowledge.

The poor performance of U.S. students on the PISA indicates that students are not being taught how to apply their knowledge and or understand how the knowledge is used in context. The current national focus on increasing STEM (Science, Technology, Engineering, and Mathematics) education is an example of where we are missing an opportunity to demonstrate to students how disciplinary content areas, such as algebra or physics, can be applied to real world situations and problem-solving. Once you learn that the Pythagorean Theorem helps carpenters and builders make perfect right angles and square corners, it makes a lot of sense to learn it. But if students are never shown how the equation is used in everyday life, it seems meaningless and irrelevant. Most of the policy responses so far to the STEM problem have been to increase the number of math and science teachers and increase the level of their content and disciplinary knowledge. It has not been about changing teaching and instruction to help students make connections between disciplinary knowledge and real applications, nor in using technology and engineering as means of teaching academic content. There has been scant attention paid to integrating science and math curriculum with technical and occupational curriculum, where many natural connections exist.

Career and technical education programs offer students the opportunity to see how theory is used and applied in very practical ways. CTE is based on project- and problem-based learning, which is a comprehensive approach to instruction that presents a project or relevant activity that enables students to synthesize knowledge and to individually resolve problems in a curricular context. Math and science concepts can easily be embedded in CTE instruction in an integrated approach. For instance, a course in forensic technology allows instructors to integrate aspects of chemistry, biology, physics, algebra, anthropology, ethics, and writing, as students learn standard scientific methods for problem-solving. SkillsUSA, one of several career and technical student organizations, sponsors state, regional, national, and international student competitions in a wide range of industries and explicitly includes academic disciplinary knowledge needed to succeed in that industry in their contests.

As previously referenced, research conducted by the University of Minnesota to study the effect of embedded mathematics in technical education courses on student performance indicated that students in these math-enhanced classes outperformed their peers in regular classes.¹⁰ Research on how we learn also supports the notion of providing instruction that embeds theory and concepts in application, makes connections to and integrates content knowledge, and assesses knowledge and skills through performance.¹¹ Increasingly, curriculum should be integrated and cross-disciplinary, reflecting the complexities of our world and careers.

¹⁰ Stone, 2006.

¹¹ Bransford, J.D., Brown, A.L., and Cocking, R.R., with additional material from the Committee on Learning Research and Educational Practice. Editors: Donovan, M.S., Bransford, J.D., and Pellegrino, J.W. (2000). *How people learn: Brain, mind, experience, and school committee on developments in the science of learning*. Washington, DC: National Academy Press, Commission on Behavioral and Social Sciences and Education and the National Research Council.

Recommendation: NCLB, in coordination with Perkins, should support developing integrated academic and technical curriculum. Professional development funds should be used to develop the skills teachers need to work across disciplines and create integrated curriculum and instruction. Initiatives to increase and improve STEM education should focus on helping teachers and students understand how math and science are applied in engineering and technology settings. More instruction and curriculum should be designed that is project- and problem-based. States should provide technical assistance and guidance to districts and schools to support the development of model curricular approaches, to train teachers in developing and using integrated instruction, and to share existing curricula through clearinghouses.

Multiple Assessments: Standardized academic assessments used in most states and districts ignore the wider range of knowledge, skills, and abilities that youth develop in high school and that are needed for success in college and careers. These content-focused assessments do not take into account other important curricular areas, such as CTE and the arts, 21st Century skills, or applied learning. Multiple assessments are needed to measure these important skills that are not currently measured by standardized tests, but the costs of developing such assessments can be prohibitive for states.

Determining how CTE fits into an academic assessment system can be challenging, because many CTE courses are not designed to teach reading, mathematics, and science skills, although they supplement that teaching. Another challenge relates to the timing of assessments. If assessments are given at the end of tenth grade, they may not capture much input or impact from CTE courses which are offered to many students in the 11th and 12th grades. Finally, there are very few assessments to measure technical skills.

Recommendation: Policymakers must become more proactive in stating that academic assessments alone are not enough to determine whether young people have the competencies needed to be successful in today's economy and society. Assessment systems need to include multiple measures that include academics, applied and contextual knowledge, critical-thinking skills, workforce readiness, and social and civic engagement skills. States, in particular, should develop a comprehensive framework that spells out what knowledge and skills are needed and when the knowledge and skills should be assessed, by whom (state/district/school), and how. NCLB should encourage states to develop broader and multiple assessments that measure more than academic proficiency. Career and technical educators should be involved as states develop or revise their assessment systems and to help develop integrated standards and crosswalks between academic and applied measures. Assessments that measure technical skills need to be developed, and the federal government can support research and development of these technical assessments and ensure a strong role for industry.

Connections to Postsecondary Education: In the past, many CTE programs were not connected to postsecondary education, as many jobs did not require education or training beyond high school. With changing labor market demands and increased expectations for students to pursue postsecondary education, all CTE programs are creating connections with and pathways to postsecondary education, including to two- and four-year degree programs, certificated programs, apprenticeship programs and connections to masters degrees and beyond. The Tech Prep program has helped forge stronger connections between high schools and community colleges and encourage articulation of credits. Many states use dual enrollment to provide high school students, including CTE students, the opportunity to take college-level classes and earn

credit. But not all students have access to these programs given geography or the costs of tuition, books and fees. Another issue for many CTE students is whether or not credits obtained under articulation agreements can be counted if the student attends a different college or pursues a different major. Oftentimes, college credit is only counted at the partnering college, and therefore, students “lose” credits if they attend a different college.

Another barrier to postsecondary enrollment for many students is lack of sufficient credits to meet college entrance requirements. Some CTE classes meet college entrance requirements, but others do not, and students are not always aware of this information. There is often a lack of clarity, consistency, and transparency with regard to which high school courses count for college entrance requirements.

Recommendation: Federal laws should encourage and support stronger connections between secondary and postsecondary education to enable more high school students to earn college credit and progress to postsecondary education more easily. NCLB should recognize and encourage dual enrollment programs, and Perkins should continue to embrace and support the Tech Prep model. States should conduct a systemwide review of articulation agreements to clarify which college credits earned by high school students are accepted at by postsecondary education institutions and colleges in the state. Tuition and funding support for books and fees for dual enrollment classes should be provided, especially for first-generation college-goers or low-income students. State K-12 and higher education systems need to work together to assess and determine which CTE courses are postsecondary credit worthy and then publicize that information to students, teachers, and guidance counselors.

Guidance and Advisement: Students and parents need more guidance and advice about the value of CTE and how it leads to postsecondary education and careers, but few get the advice they need for their career and education decision-making. Students also need information and guidance about multiple pathways and options that are available to them. However, there are not enough high school guidance counselors to meet demands, and the high school guidance counselors we do have are asked to serve too many students, and the quality of their advice suffers. Many counselors do not know about the workforce needs in their community and lack knowledge on emerging jobs (mainly because their unmanageable caseloads limit their opportunities to learn). Many schools assess counselors by the number of students that enter four-year colleges and universities, which can pressure counselors into recommending that pathway, regardless of the interests of the student or other quality choices. Also, with the increased focus on testing and accountability, many guidance counselors are finding that their time is being diverted to test administration. Teachers and other adults in the school often do not take advantage of naturally occurring opportunities to make connections between instruction and career awareness and guidance.

Recommendation: Federal and state governments can encourage and support guidance and advisement by providing funding for more counselors in high schools. Counselors need training and development about the value of CTE and about the 16 career clusters and emerging careers in those industry sectors, so they are better able to advise students and parents. Professional development for teachers should include information about the career clusters and strategies for building career awareness into instruction. States can require students to develop a four- or five-year college and career plan, or to designate a career major during high school, as a way to help connect their academic studies to future plans. Section 118 of the Perkins Act, which provides

funding to support career guidance and academic counseling programs and promote improved career and education decision-making, should be fully funded.

Training and Professional Development: With regard to the preparation of teachers, most colleges of education do not offer occupational or technical education programs and have limited knowledge about CTE, career clusters, career pathways, and performance-based assessments. Few schools of education focus on helping prospective teachers understand how knowledge is applied in real-world settings, so most teachers emerge from colleges of education prepared for general education, but not prepared to teach CTE or to help students learn how to apply knowledge.

Because most colleges of education do not have a focus on CTE, there is a shortage of qualified CTE teachers. Also, most colleges of education do not help prospective teachers learn how to develop and execute quality CTE curriculum. As a result, many schools rely on industry experts to bring technical knowledge and skills into the classroom to supplement this lack of focus on CTE.

Once teachers are in the classroom, they need professional development on several fronts. First, if academic and CTE teachers expected to develop and use integrated curriculum and lesson plans, both groups of teachers need to learn new skills. Academic teachers need to become more adept at translating how theoretical or conceptual knowledge is applied and used in various real-world settings, and CTE teachers need to learn how to use CTE instruction to supplement, enhance, and reinforce academic concepts and build in academic content where appropriate. Professional development is also needed to help teachers understand the various models of curriculum integration, such as building in the application of knowledge in academic classes, building more academic concepts in technical curriculum, or creating blended lesson plans. All teachers need information on the development of interdisciplinary courses, and there should be a special focus on developing this curriculum in pre-engineering, information, and emerging technologies. All future teachers will need these skills.

Another professional development need relates to student assessments and using multiple and varied assessments, not just standardized tests. Many academic teachers are not familiar with performance or competency-based assessments that are more commonly used in CTE, and they need to understand how these types of assessments can be aligned with and related to standardized academic assessments. Teachers need to understand the full range of skills on which students should be assessed so they can develop integrated and competency-based curriculum and use a range of multiple assessments to measure these skills.

Recommendation: NCLB and Perkins both provide sizeable funding to states and school districts for teacher training and support programs. Professional development funds in NCLB should be made available for CTE teachers so that they might achieve the highly qualified status under NCLB. Both laws should ensure a focus on supporting teachers to develop integrated curriculum based on rigorous academics pegged to standards and the development of applied teaching and learning. Professional development should help CTE teachers learn more about the academic content they can supplement, reinforce, enhance, and apply in their classrooms, and help academic teachers learn how academic knowledge and concepts can be applied in technical settings. Language in NCLB and Perkins should be aligned and should encourage professional development on using multiple assessments, specifically performance- and competency-based

assessments. Professional development efforts at the state level need to include all teachers from various disciplines so cross training occurs and teachers become knowledgeable about a range of instructional and pedagogical practices. States should encourage their colleges of education to offer classes and specialties in CTE and require that all prospective teachers be exposed to curriculum integration models and applied teaching and learning strategies.

Teacher Certification and Credentialing: Because of the shortage of qualified teachers, states and districts are offering a wider variety of certification programs for teachers, and others are trying to simplify and streamline the process, hoping to attract more individuals to the classroom. Ensuring that CTE teachers have industry credentials is an important requirement, to ensure quality instruction. But given the shortages of CTE teachers with necessary and current industry knowledge, many high schools and community colleges are bringing industry experts into the classroom as adjunct teachers to supplement the teaching workforce. Many school districts, particularly small, rural, and urban ones, are having difficulty in finding highly qualified teachers who teach in specialized areas, such as CTE teachers that also teach core academic subjects.

Recommendation: Programs that attract skilled individuals from industry to be full, part-time, or adjunct instructors in areas of labor market demand or science, mathematics, engineering, and technology should be created or expanded. These instructors need to have industry credentials, and then be given support and mentoring to allow them to provide effective instruction, either on their own, if certified, or in tandem with a certified teacher. This should apply to both secondary and postsecondary institutions, and to the extent feasible, programs should support sharing of teachers between the two sectors. A national portable teacher credential for CTE would allow greater mobility across states and regions and might help even out teacher shortages in certain areas. The creation of portable CTE certificates would also help address shortages, and the federal government could help spur the development of such credentials in partnership with industry. State efforts, such as in California, to streamline the CTE teacher credentialing process can create incentives for CTE teachers by allowing them to move more easily across subject areas, making CTE teaching a more viable professional choice; provide districts with added flexibility, making it easier for districts to hire CTE teachers and expand CTE course offerings; and create a more transparent and approachable credentialing process, thus assisting recruitment efforts.

Quality of Career and Technical Education Programs: The quality of many CTE programs has improved as they have become more academically rigorous and strengthened connections to postsecondary education and the labor market. But high quality CTE programs are not accessible to every student that wants to pursue such studies, and there are still outdated CTE programs that lack academic rigor and relevance to the labor market. As policymakers work to improve CTE programs, they must also pay attention to the distribution of these programs, so all students have access to high quality options. Measuring the quality of CTE programs is also a challenge. Existing academic assessments do not take into account the unique features of CTE (preparation for employment and development of technical skills, for example), nor do they recognize the variation in CTE across industry clusters. There is also a lack of high quality interdisciplinary curriculum as well as a shortage of well-trained teachers (see above) to integrate academics and CTE, which are elements of high quality CTE programs.

Recommendation: Appropriate measurements need to be in place so that students, parents, postsecondary educators, and employers can gauge the quality and success of CTE programs.

The federal government can assist by helping to develop model frameworks to measure the quality of CTE programs with assessments based on numerous factors, such as the number of instructors with industry credentials or availability of professional development on an ongoing basis for academic and CTE teachers, etc. The federal government should provide funding and assist states in the development of their own quality assurance systems. These systems should support the development of strong CTE programs, shut down weak programs, and ensure an equitable distribution of high quality CTE programs across the state and within communities. These quality assessments should be developed with strong industry input to ensure relevance to the labor market. States should support efforts to build the capacity of administrators and teachers (both regular and CTE) which is essential to creating and sustaining high quality CTE programs.

Evaluation of Student Participation in Career and Technical Education: Research demonstrates that CTE students have higher grade point averages, increased test scores, higher graduation rates, and increased college and university enrollments when there is an increase in academic course taking within a curriculum integration framework and when CTE students are placed in smaller learning communities (such as career academies) that have well-defined career pathways.¹² Data from California indicates that 59 percent of students in California Partnership Academies met the A-G college-entrance standards compared to only 39 percent of all other students not in Partnership Academies,¹³ which is noteworthy because Partnership Academies are designed to serve lower-performing students. Research from MDRC indicates significant labor market gains for certain groups of students who participated in career academies.¹⁴

Aside from these studies, there is little longitudinal data on how CTE students fare after they leave high school. First, most states and school systems are not able to track students from secondary to postsecondary education to the labor market, although increasingly states are designing longitudinal data systems that will allow them to do so. Some challenges in tracking students relate to privacy laws that in many cases prevent them from accessing data across secondary and postsecondary education and into the workforce. In states that have developed such data systems, they are often heavily reliant on student participation in surveys, which may or may not be reliable from a statistical standpoint.

Identifying CTE students can be difficult because of the numerous ways participation in CTE classes can be characterized and defined. Also, being able to make a connection between the technical or occupational classes a student studies and further postsecondary studies and labor market participation is very challenging. Some CTE students take classes in several industry areas (such as pre-engineering and business), in order to develop a diverse portfolio of skills, which makes it hard to identify the career major and subsequent links to college or career outcomes. Another challenge in tracking student outcomes is that the external agents that provide industry certifications often do not report students' performance on industry tests to schools.

¹² Castellano, 2004, and Stone, J. R., III, & Aliaga, O. A. (2003). *Career and technical education, career pathways, and work-based learning: Changes in participation 1997–1999*. St. Paul, MN: National Research Center for Career and Technical Education.

¹³ ConnectEd: The California Center for College and Career. (2007). *Why pathways? A better approach to transforming high school education in California*. Berkeley, CA: ConnectEd: The California Center for College and Career.

¹⁴ Kemple, 2004.

Recommendation: The federal government can support the design of comprehensive data systems across programs and educational sectors. The federal government can also review definitions to ensure consistency across laws and ensure that privacy protections remain strong but allow collection of necessary data. The federal government can also collect statewide data and make it available in a national clearinghouse. Additional federal research should be supported to determine longer-term academic and labor market outcomes of CTE students to better understand the pathways that students pursue from high school to postsecondary education and careers. As states develop longitudinal student record data systems and student identifiers, they need to identify and track students who participate in CTE and their long-term outcomes. States should develop the capacity to track labor market participation of all students, and incorporate external industry certifications in any data collection system, to the extent possible.

Closing

Increased attention on making high school engaging and relevant for all youth is creating opportunities for high quality CTE programs. The key elements of high quality CTE, such as enhanced academics married with applied learning, connections to career pathways and the labor market, opportunities to develop 21st Century and employability skills, exposure to work and mentoring from employers, and opportunities to connect to postsecondary education, have been shown to be effective for students throughout the U.S. Education policymakers have an opportunity to expand high quality CTE programs to help more students be successful.

Presenters at AYPF Forums:

Dr. Laurel Adler, Superintendent, East San Gabriel Valley Regional Occupational Program and Technical Center, California

Patrick Ainsworth, Assistant Superintendent for Secondary, Postsecondary & Adult Education, California Department of Education, California

Duane Crum, California State Director, Project Lead the Way, California

Phyllis Eisen, Vice President, The Manufacturing Institute, and Executive Director, The Center for Workforce Success, Washington, DC

Michael Hanlon, Founder, Health Careers Academy at Palmdale High School, California

Alex Harris, Senior Policy Analyst, National Governors Association, Washington, DC

Gary Hoachlander, Executive Director, ConnectEd: The California Center for College and Career, California

Mike Ogilvy, Vice President of Sales and Marketing, intelitek, Inc., New Hampshire

Kathy Oliver, Assistant State Superintendent, Maryland Department of Education, Maryland

Michael Owens, Associate Secretary, Adult Education and Workforce Development, Delaware Department of Education, Delaware

Mark Whitlock, CEO, Central Education Center, Georgia

Patrick Savini, Superintendent, Sussex Technical School District, Delaware

Expert Participants:

Mark Ames, National Association of Secondary School Principals

Kate Blosveren, Achieve, Inc.

Betsy Brand, American Youth Policy Forum

Jan Bray, Association for Career and Technical Education

Adam Briddell, Office of U.S. Senator Mike Enzi

Michelle Dinkes, National Association of State Boards of Education

Todd Flaherty, Council of Chief State School Officers

Michael Fong, U.S. Department of Education

Steve Frank, U.S. Department of Education

Casey Fromson, Office of U.S. Senator Patty Murray

Brian Fu, U.S. Department of Education

Domenic Giandomenico, National Association of State Directors of Career and Technical Education Consortium

Lynn Gilli, Maryland Department of Education

Loretta Goodwin, American Youth Policy Forum

Liz Grant, Office of U.S. Senator Patty Murray

Alex Harris, National Governors Association

Gregory Henschel, U.S. Department of Education

Ricardo Hernandez, U.S. Department of Education

Scott Hess, U.S. Department of Education

Gary Hoachlander, ConnectEd: The California Center for College and Careers

Ellen Holland Kelly, U.S. Department of Education

Cassius Johnson, Jobs for the Future

Dale King, U.S. Department of Education

Bethany Little, Alliance for Excellent Education
Lydia Logan, U.S. Chamber of Commerce
Chris Lyons, Office of the State Superintendent of Education of the District of Columbia
Joanna Mikulski, U.S. Department of Labor
Sharon Miller, U.S. Department of Education
Jay Noell, U.S. Department of Education
Greg Roth, U.S. Chamber of Commerce
Elizabeth Russell, Virginia Department of Education
Gerhard Salinger, National Science Foundation
Lisa Schilling, Chartwell Education Group
Edward Smith, U.S. Department of Education
Anne Stanton, James Irvine Foundation
James Stone, University of Louisville
Carolyn Teich, American Association of Community Colleges
David Wakelyn, National Governors Association
Theda Zawaiza, U.S. Department of Education